Video and optical laryngoscopy for intubation

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New technology is always exciting, including the flood of new intubating devices using video technology, aimed mainly at alleviating 'difficult' or 'failed' intubations. Despite the lack of good scientific evidence to support the use of any specific device, there appear to be some advantages in terms of ease of use and limitation of cervical spine movement. Moreover, studies have shown it is easier to master endotracheal tube insertion with these devices and they may be appropriate for the 'occasional intubator'. Whilst the Macintosh Laryngoscope blade has remained the most common device used to aid intubation under direct vision, continued use of these video devices in routine cases may reveal further reasons for use.

The difficult airway

The 'difficult' or 'failed' airway remains a serious concern for every anaesthetist. Even though they are well practiced in the management of a 'can't intubate' or 'can't intubate, can't ventilate' scenario, these situations can be terrifying for all concerned and failure to secure an airway can have serious sequelae.

No device is perfect in all circumstances. It is imperative that practitioners are familiar and competent with a specific device before they use it in a 'difficult' situation.

The optical and video laryngoscopes available use fixed curves to allow 'indirect' viewing during intubation, that is, there is no need to align oral, pharyngeal and laryngeal axes to directly view the vocal cords. In this way, these devices may provide an alternative means of intubation to 'blind nasal techniques' or fibre-optic laryngoscopy.

All of these new devices are in direct competition with each other, with each specific instrument having unique features. Most claim that they can be used in patients with limited mouth opening (<2.5-3cm) and will provide a 'Grade 1' view of the larynx when direct laryngoscopy fails. The most commonly seen devices in Australia are the GlideScope™, CTrach™, Pentax-AWS™ and Airtraq™ (while other available intubating devices come from McGrath, Storz, Shikani, Bullard, Wu, Upsher, Levitan and Bonfils).

Available devices in Australia

The GlideScope™ has been available since 2002 and is essentially a conventional Macintosh laryngoscope with a camera in the blade tip. This allows an image to be viewed on a separate, portable screen. Although one can often gain a good view of the larynx, the endotracheal tube (ETT) is still passed blindly through the oropharynx until visualised on the video screen. This may cause injury to any part of the upper airway.

The CTrach™ is based on the Fastrach laryngeal mask airway (LMA), utilising fibreoptics to provide a view on a screen mounted on the device handle. Its specific advantages are that it is based on a familiar device for most anaesthetists, and often provides a good method of ventilation. A good view of the larynx may be difficult to obtain however.

The Pentax-AWS™ was released in 2006 and has a handle containing the light source, batteries and a large LCD screen. A disposable clear plastic blade (PBlade) is attached which provides a guiding conduit for an ETT, and for the 12cm cable and camera. This device is inserted in the midline, much like an LMA, and its specific curve claims to offer a good view every time. The ETT guide avoids the problems of blind passage of the ETT.

Pentax-AWS demonstration during a recent anaesthetics conference in Perth.

The Airtraq™ is a fully disposable device with a similar curve to the Pentax-AWS™. It has two anatomically shaped channels, one for the optics and one to allow passage of an ETT. It uses prisms and mirrors to allow the practitioner to gain a view of the larynx. There is, however, no video display of the view gained.

Research and evidence

Published reports on these recently developed devices are case series or manikin based studies, with few randomised controlled studies. It is extremely difficult to perform a blinded study and difficult to extrapolate the findings of manikin studies into 'real life' scenarios with humans.

The potential advantages of these devices appear to be:

1. **An alternative to direct laryngoscopy** in the management of failed intubation. It must be noted that success in this highly rare and stressful situation is correlated with familiarity and training with a device. There is only limited evidence that indirect laryngoscopy results in a higher rate of successful intubation.
2. **Ease of use**. It has been reported that the learning curve to proficient use is much quicker and easier with these devices than a traditional Macintosh blade. This may mean these devices have a role for the 'occasional intubator', such as the emergency physician and remote or rural doctor.
3. **Cervical spine stability**. There is good evidence that in patients with cervical spine injury, these devices offer a quicker time to intubation, better haemo-dynamic stability and less c-spine movement when compared with manual in-line stabilisation and standard laryngoscopy.
4. **Awake intubation**. There are several reports of the successful use of these devices for awake intubation. They appear to be well tolerated in topically anaesthetised awake patients; however this needs to be studied further.
5. **Teaching**. Several of the devices display an image of the larynx on a video display and may be used to demonstrate techniques to trainees.

Disadvantages may be:

1. **Difficult ETT insertion** despite a good view of the larynx. As there is no requirement for alignment of the oral, pharyngeal and tracheal axes, in some devices the ETT is inserted blindly through the oropharynx. Consequent insertion 'round the corner' is partially overcome in devices featuring a guidance channel. Semi-malleable or Schroeder stylets may be useful for navigating corners.
2. **Anatomical Injury.** Damage to the tonsillar pillars has been seen in devices with no ETT guide. All devices must be gently inserted and never advanced against resistance.
3. **Misting, or condensation**. This occurs commonly on the viewing mechanism. It may be minimised by the use of antifogging solution. ■